

SECTION 02215

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SCOPE

- A. This Section includes trenching, bedding, and backfilling materials and placement.

1.02 RELATED SECTIONS AND PLANS

- A. Section 02100 - Surveying
- B. Section 02200 - Earthwork
- C. Section 02225 - Compacted Clay Liner and Cap
- D. Part 6 - Statement of Work
- E. Part 8 - Environmental Health and Safety, and Training Requirements
- F. Part 9 - Quality Assurance Requirements

1.03 REFERENCES

- A. Latest version of American Society for Testing and Materials (ASTM) Standards:
 - 1. ASTM C 136. Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D 698. Standard Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixture using a 5.5 Pound Rammer and a 12-inch Drop.
 - 3. ASTM D 2487. Standard Test Method for Classification of Soils for Engineering Purposes.
- B. Latest version of Ohio Department of Transportation Construction and Material Specifications (Ohio DOT Specifications).
- C. Latest version of Occupational Safety and Health Administration (OSHA) Construction Standards.

- D. "Off-Site Borrow Materials - Geotechnical Evaluation Report" (Revision 0) prepared by Parsons, June 1996. "*Off-Site Borrow Materials Evaluation*" [Parsons, 1996b]. This report presents geotechnical data for potential off-site borrow sources for OSDF construction materials, including fine and coarse concrete aggregates, pea gravel, and riprap.
- E. Reference Reports addressing OSDF and borrow area site subsurface conditions:
 - 1. "*Geotechnical Investigation Report, On-Site Disposal Facility*" [Parsons, 1995]. This report contains geotechnical data for the subsurface soils in the OSDF area.
 - 2. "*Disposal Facility Pre-Design Geotechnical Investigation, Soil Investigation Data Report, CERCLA/RCRA Unit 2*" [Science Applications International, 1995]. This report presents geotechnical data for the subsurface soils in the OSDF area.
 - 3. "*Geotechnical Data and Evaluation Report for East and South Field Borrow Areas*" [Parsons, 1996a]. This report contains geotechnical data for the subsurface soils in the East Field borrow area.

1.04 SUBMITTALS

- A. Submit the following to the Construction Manager for review within 30 calendar days from Notice to Proceed:
 - 1. the source of the embedment fill along with written certification that the embedment fill meets the requirement of this Section to include test results from ASTM C 136 and ASTM D 2487; and
 - 2. a 50-pound representative sample of the embedment fill.
- B. Provide a list of equipment and description of construction methods for trenching and backfilling in the Earthwork Work Plan specified in Section 02200.

1.05 EXISTING CONDITIONS

- A. Verify the existing conditions as specified in Section 02100.
- B. Existing site surface and subsurface conditions, based on available site data, are indicated on the Construction Drawings and in the reference reports identified in this Section.
- C. Ground-water levels in the brown and gray till layers at the site vary during the year and may be higher than those shown on the Reference Drawings. Levels may approach ground surface during extended periods of heavy precipitation.

1.06 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental, health and safety, and other training requirements shall be as specified in Part 8 of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Furnish embedment fill material for reinforced concrete pipe (RCP), corrugated metal pipe (CMP), HDPE pipe, and polyvinyl chloride (PVC) pipe meeting the requirements of Section 703.06 of the Ohio DOT Specifications unless otherwise indicated on the Construction Drawings.
- B. Furnish backfill material for RCP culverts, CMP culverts, HDPE pipes, and PVC pipes, and gravity drainage inlet structures meeting the material requirements for compacted fill as specified in Section 02200.
- C. Obtain trench backfill material for liner system anchor trenches from OSDF excavation or borrow area excavation that meet the material requirements for compacted clay liner material as specified in Section 02225.
- D. Furnish bentonite granules as specified in Section 02225.
- E. Furnish a minimum 4-inch wide plastic underground warning tape with integral magnetic locator wire to mark HDPE and PVC pipes and electrical conduits.

2.02 EQUIPMENT

- A. Furnish equipment necessary to perform the work specified in this Section.

PART 3 EXECUTION

3.01 GENERAL

- A. Review existing site utility drawings and identify and stake existing utilities in vicinity of trench lines.
- B. In areas of trenching and backfilling, maintain and protect existing above and below ground utilities.

- C. Do not damage or disturb survey benchmarks, finished construction, and existing utilities and structures.
- D. Dust control for trenching and backfilling shall be in accordance with Part 6 of the Contract Documents.

3.02 TRENCHING

- A. Trench subsoils for placement of pipes, culverts, and anchor trenches to the depths and minimum dimensions shown on the Construction Drawings. Manage excavated material in accordance with Section 02200.
- B. Use sheeting and bracing, or other method approved by the Construction Manager, as necessary to maintain the safety and stability of slopes and trenches and to protect adjacent utilities and structures. Satisfy applicable local, state, and federal requirements for slope and trench sheeting and bracing, including requirements of the Occupational Safety and Health Administration (OSHA) Construction Standards. Provide sheeting and bracing materials on site prior to the start of trenching. Adjust spacing and arrangement of sheeting and bracing as required by conditions encountered. Remove sheeting and bracing as backfill progresses. Fill any voids left from sheeting or bracing withdrawal with compacted fill or other approved material.
- C. Protect and maintain the trench bottom. Remove rock fragments or raveled materials that collect on the trench bottom. Backfill any overexcavation with embedment fill. Excavate any soft subgrade encountered at the trench bottom and backfill to trench bottom elevation with embedment fill or compacted fill.
- D. Where trenches will be excavated in fill areas, perform trenching only after compacted fill has reached at least to the spring line of the pipe.
- E. Limit the maximum length of open trench to 200 feet in advance and 200 feet behind pipe installation.
- F. Dewater geosynthetics anchor trenches continuously. Perform dewatering in accordance with Section 02200.
- G. The inside edge of anchor trenches where geosynthetics will be placed shall be cut with a trenching machine to prevent soil raveling and shall be rounded a minimum of 6-inch radius.
- H. Stockpile excess material from trenching in accordance with Section 02200.

3.03 BACKFILLING

A. General:

1. Do not backfill with frozen or saturated material.
2. Do not backfill over frozen, wet, or soft subgrade.
3. Do not disturb or damage piping or geosynthetics in the trench during backfilling.
4. Do not use heavy compaction equipment which is greater than 10 pounds per square inch ground pressure, over piping that is covered by less than 12 inches of backfill material.

B. Placement of embedment fill for pipes and culverts;

1. Place embedment fill in 7-inch \pm 1-inch thick loose lifts to the elevation of the bottom of the pipe or culvert.
2. Compact embedment fill with a minimum of 4 passes of a vibratory plate compactor prior to placing pipe.
3. Place pipe or culvert on top of the compacted embedment fill.
4. For pipes or culverts 12 inches in diameter or less, place additional embedment fill on the sides and gently hand tamp the fill around the sides as needed to insure that intimate contact between the pipe or culvert and the embedment fill is maintained below the spring line of the pipe. Continue placing embedment fill until it is even with the top of the pipe. Compact the embedment fill with a minimum of 4 passes of a vibratory plate compactor. Continue to place embedment fill above the top of pipe to a depth of 7 ± 1 inch. Compact the embedment fill with a minimum of 4 passes of a vibratory plate compactor.
5. For pipes or culverts greater than 12 inches in diameter, place embedment fill in 7-inch \pm 1-inch thick loose lifts to the limits shown on the Construction Drawings. Compact each lift with a minimum of 4 passes of a vibratory plate compactor.
6. For horizontal monitoring well pipe trenches and HDPE pipe trenches between HDPE manholes and the cell outlet, construct a soil-bentonite plug every 50-feet along the length of the trench. Prepare soil-bentonite mixture consisting of embedment fill at its natural moisture content mixed with minimum 10 percent (by dry weight basis) bentonite granules. Thoroughly mix with a portable cement mixer or other suitable method. Place and compact the soil-bentonite mixture in the same manner as the embedment fill.
7. Except for HDPE piping between manholes and cells, embedment fill may be compacted by water in accordance with the requirements of Section 603.08 of the Ohio DOT Specifications. Contractor shall submit methods for compacting embedment fill by water for the review and approval by the Construction Manager.

C. Placement of backfill material for pipes and culverts:

1. After placement and compaction of embedment fill, place the first lift of backfill material in a 12-inch loose lift. Place subsequent lifts of trench backfill material in 8-inch \pm 1-inch loose lifts.
 2. Compact each lift to 95 percent of the maximum standard Proctor dry unit weight and at a moisture content within \pm 3 percent of the optimum moisture content as determined by ASTM D 698.
- D. Trench backfill material for liner system anchor trench:
1. Place the anchor trench backfill material in 8-inch thick (\pm 1 inch) loose lifts if compaction equipment weighing greater than 2000 pounds will be used, and in 4-inch thick (\pm 1 inch) loose lifts if compaction equipment weighing less than 2000 pounds will be used.
 2. Compact the anchor trench backfill material to the minimum dry density and moisture contents required for compacted clay liner material in Section 02225.
- E. Place underground warning tape above first lift of compacted trench backfill and directly above all HDPE pipes.

3.04 CONSTRUCTION QUALITY REQUIREMENTS

- A. The CQC Consultant will perform conformance testing on the embedment fill and trench backfill materials to establish compliance with this Section and Sections 02200 and 02225, as applicable. The conformance testing to be performed and the testing frequencies are given in the Construction Quality Assurance (CQA) Plan, referenced in Part 9 of the Contract Documents.
- B. The CQC Consultant will perform performance testing on the backfill materials to establish compliance with this Section. The performance testing to be performed and the testing frequencies are given in the CQA Plan.

3.05 SURVEY CONTROL

- A. Survey the limits and elevations of the bottom of the liner system anchor trench in accordance with Section 02100.

3.06 TOLERANCES

- A. Excavate the liner system anchor trench within 0 to +0.2 feet of the depth indicated on the Construction Drawings.

[END OF SECTION]